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(54) **Method for compressing and decompressing moving picture information and video signal processing system**

Verfahren zur Kompression und Dekompression von Bewegtbildinformationen und Videosignalverarbeitungssystem

Méthode pour la compression et décompression d'informations d'images en mouvement et système de traitement de signal vidéo

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to image processing techniques and more particularly, to a technique which can be especially effectively applied to a method for compressing and decompressing moving pictures. More particularly, the present invention pertains to a compression/decompression method by which, when it is desired to combine a restored image with another image to a combined image or video signal for example, a key signal necessary for it can be simultaneously suitably recorded or transmitted together with the combined video signal, and also pertains to a video signal processing system which can remove the key signal from the combined video signal including the key signal to output the combined video signal.

[0002] There has been conventionally well known such a method (e.g. US-A-4774507) as a "chroma key" scheme, when it is desired to superimpose a moving picture on another image to form a combined image, for image-picking up a target object with a solid-color or unfigured background behind it and generating a key signal indicative of the presence or absence of the background from the background color for the formation of the combined image.

[0003] In such a prior art image combining method as mentioned above, however, when a moving picture is subjected to a high-efficiency coding (i.e., data compression) and then to a decompressing operation, the compressed moving picture cannot always be restored to the original image and thus the key signal cannot sometimes be reproduced correctly. For this reason, a problem sometimes occurs that such a place (which will be referred to as the background, hereinafter) as to be replaced by another image on the basis of the key signal cannot be correctly replaced thereby or conversely such a place (which will be referred to as the foreground, hereinafter) as not to be replaced by another image can be wrongly replaced thereby.

SUMMARY OF THE INVENTION

[0004] It is an object of the present invention to provide a method for compressing and decompressing moving pictures on a high-efficient coding basis which can eliminate the above problem in the prior art and can reproduce a key signal correctly.

[0005] Another object of the present invention is to provide a video signal processing circuit which can reproduce a key signal highly accurately and can decompress a moving picture subjected to a high-efficiency coding to reproduce a high quality of original image.

[0006] In accordance with an aspect of the present invention, to achieve the above objects there are provided methods, recording media and system as set out in claims 1, 10 and 12-14.

[0007] In another aspect of the invention, it is desirable that key signals of both pixels adjacent to a target pixel of reproduction video information are referred to and when either one of the key signals indicates background, the key signal of the current pixel is changed to have a value indicative of background.

[0008] With the above arrangement, when the range of the key signal and the video signal which may have are uniquely specified to make large the distance in signal level between the ordinary video signal and key signal and to perform coding thereover, the separation between the video and key signals from the compressed and decompressed image can be facilitated and thus the video and key signals can be correctly reproduced. Further, since the discrimination between the both signals is carried out with use of the threshold, the correct separation between the video and key signals can be carried out while avoiding an error in the decompressed video signal. Furthermore, since the threshold is prepared to have a plurality of values, the accurater separation between the video and key signals can be realized. In addition, since key signals of both pixels adjacent to a target pixel of reproduction video information are referred to and when either one of the key signals indicates background, the key signal of the current pixel is changed to have a value indicative of background, the reproduction of the key signal can be realized at the border between the background and foreground.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Other objects, features and advantages of the invention will become apparent from the detailed description of the embodiments taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a bit format of a video signal in a prior art showing how to assign bits of the video signal not including an ordinary key signal;

Fig. 2 is a bit format of a video signal in accordance with the present invention showing how to assign bits of the video signal including a key signal, with part of video information removed;

Fig. 3 is a diagram for explaining a coding procedure when a video signal having a key signal included therein is recorded and transmitted;

Fig. 4 is a diagram for explaining a decoding procedure when the key signal and video information are separated from a video signal subjected to a data compression/decompression;

Fig. 5 is a diagram for explaining a spatial phenomenon which possibly occurs when a key signal and video information are separated from a video signal subjected to a data compression/decompression;

Fig. 6 is a block diagram of a video signal processing (reproducing) circuit in accordance with an embodiment of the present invention; and

Fig. 7 is a block diagram of an embodiment of the

present invention when the circuit of the invention is applied to a moving picture reproducing system using an MPEG video decoder for decoding a moving picture.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] An embodiment of the present invention will be explained with reference to the accompanying drawings.

[0011] For simplicity of description, explanation will be made as to an embodiment in which each of the pixels of a video image is made up of 8 bits. Even when the amount of information on one pixel is other than 8 bits, the present invention can be embodied in a similar manner.

[0012] Fig. 1 shows how to assign the bits of a prior art video signal not containing a key signal. This video signal, as illustrated, has an information amount of 8 bits, i.e., its most significant bit (MSB) ly7, bits ly6, ly5, ly4, ly3, ly2, ly1, and its least significant bit (LSB) ly0. In the prior art, however, when it is desired to record or transmit the video signal, no consideration is paid to such an application as to combine the video signal with another video signal. In other words, a method for recording or transmitting a key signal for use in the image composition or combination is not prepared.

[0013] The present embodiment is intended not to add any modification to the prior art recording/transmitting method and to record and transmit a key signal while maintaining compatibility with the prior art. To this end, the present embodiment has a bit array such that the information on the format of each of the pixels of the video signal is partly deleted and instead a key signal is assigned thereto. Although the key signal can be made up of a plurality of bits, it may be made up of only one bit since the key signal is sufficient only to have information (such as a flag) indicative of replacement or non-replacement of an image with another image at the time of image composition. In the present embodiment, the least significant lowest bit ly0 was deleted in the video signal. In this connection, however, it will be readily appreciated that the amount of information of the video signal is not limited to 8 bits but may be any number of bits.

[0014] Shown in Fig. 2 is how to assign the bits of a video signal including a key signal when the aforementioned method is applied. Since the amount of image data becomes usually enormous, the image data is in many cases subjected to a data compression when it is desired to record or transmit the image. When the image is subjected to the data compression and then to a data decompression, however, the compressed image cannot be always restored to its original image. In the case of an ordinary video signal, when several of the lower bits of the video signal vary, this will substantially not influence the reproduction of the video signal. However, a change in the key signal may possibly result in erroneous reproduction of the foreground and background. To avoid such situation, in the present embodiment, the key signal is assigned to the most significant bit (MSB) position 2k0 which is least influenced when the data is subjected to the data compression and decompression.

[0015] Further, when the key signal has a value indicating that the video pixel in question refers to a background, the pixel is replaced by a foreground video image in its image combination mode and thus video information on the pixel becomes unnecessary.

[0016] In this case, it is previously determined to record zeros(o's) (value) in bits 2y7 to 2y1 of the video signal, so that a level distance between the video signal and key signal can be made large. As a result, even when the data compression/decompression of the video signal results in the fact that an error occurs for the original image due to the discrete cosine transform (DCT) processing in the data compression/decompression, the key signal can be correctly reproduced.

[0017] With the above bit assigning method in mind, explanation will be made of a coding procedure when a video signal including a key signal is recorded or transmitted, referring to Fig. 3. In this connection, it is assumed that the key signal indicative of a background has a logical value of "0" (bit 2k0=0) and the key signal indicative of a foreground has a logical value of "1" (bit 2k0=1). Such an assumption will not lose the versatility of the present invention, because the reversal of this assignment enables implementation of the present invention in the similar way to the above. Accordingly, in the present embodiment it is assumed that the key signal has such meanings as mentioned above.

[0018] As shown in Fig. 3, when video information 301 corresponding to one of the pixels of an image is assumed to have an information amount of 8 bits, the video information 301 can take values of 0-255 and video information 302 corresponding to the video information 301 but deleted by one bit can take values of 0-127. When the above pixel corresponds to part of a foreground of the image, the key signal has a value of "1". Therefore, "1" is set at the highest bit position and the values of the bits of the video signal are added by an offset value of 128 according to the assignment of the bits of the video signal including the aforementioned key signal to be converted to information 303 having a range of values of 128-255. When the pixel corresponds to part of a background of the image, the key signal has a value of "0" and its video information which becomes unnecessary at the time of image combination is also previously set at a value of 0, which results in that a video signal 304 corresponding to the background has a value of 0 and thus such information as to take values of 1-127 becomes absent at the time of coding.

[0019] When the above video signal is subjected to data compression and decompression, this causes an error between the original and reproduced images, whereby there may appear at the time of the decoding a video signal having values of 1-127 which has not

been present at the time of the coding. To avoid such a video signal error, the key signal and video information are separated from the video signal having the error caused based on the original video signal. The decoding procedure for the separation will be explained with reference to Fig. 4.

[0020] As mentioned above, there is theoretically no occurrence that the video signal has values of 1-127 at the coding stage. However, when the image data is subjected to a compression, recorded or transmitted and then subjected to a decompression, an error takes place between the original and reproduced images, which results in that there occurs such a situation that the information having taken values of 128-255 as its initial foreground video information 403 takes values of 127 or less (information 401) or the information having taken a value of zero as the background key signal takes values of 1 or more (information 402).

[0021] When a threshold 400 for separation between the background key signal and foreground video information is previously set prior to the decoding, a key signal 406 indicative of the background can be separated from video information 404 containing the foreground key signal by clipping the background key signal and the foreground video information with use of the threshold 400. When the key signal indicates the foreground, the key signal (bit 2k0) having a value of "1" and indicative of the foreground is deleted, the video signal is expanded or decompressed by a factor of 2, and then restored to the original video information (information 405). When the threshold for separation between the key signal and the video signal is set to selectively have a value of, e. g., 64, 96 or 128 (see Fig. 5), even the video signal already subjected to the coding can be adjusted at the time of the decoding.

[0022] Fig. 5 is a diagram for explaining a variation in a video signal when image data is compressed and decompressed in such a manner as mentioned above as well as a spatial phenomenon which possibly takes place during the compression and decompression. Also shown in Fig. 5 are an image 502 having a foreground 504 and also having a key signal indicative of replacement of a background 503 to be replaced by another image at the time of image combination, as well as a video signal level (more particularly, luminance signal level) corresponding to any one line 501 in the image.

[0023] In Fig. 5, when attention is turned to a video signal 505 of an original image prior to a data compression, the video signal 505 corresponding to zones of 50b-50c and 50d-50e corresponds to part of the foreground, the video signal 505 has values higher than a threshold 128. While the video signal 505 corresponding to zones of 50a-50b, 50c-50d and 50e-50f other than the above zones 50b-50c and 50d-50e has a value of 0. A video signal 506 subjected to a data compression/decompression has an error with respect to the video signal 505 of the original image. In order to avoid an information error caused by the error between the original and compressed/decompressed video signals, suitable thresholds 509-511 are set to separate the key signal from the video signal. However, in the border between the foreground and background, even when these thresholds are critically set, there may occur levels 507 and 508 such that the key signal cannot be correctly separated from the video signal.

[0024] In such a case, means for adjusting the key signal is provided so as to allow selection of expansion or non-expansion of the background key signal in the decoding mode.

[0025] The word "expansion" of the background key signal means that image data is subjected to a line or raster scan while key signals of adjacent thereto are referred to, so that, if either one or both of the adjacent key signals indicate the background, then the key signal of the current pixel is also regarded to have a value indicative of the background. This enables the key signal erroneously reproduced at the border between the background and foreground to be appropriately adjusted.

[0026] Turning now to Fig. 6, there is shown an example of an image reproducing circuit as an embodiment of the method of the present invention. In Fig. 6, a key-signal enable/disable signal indicates whether an input video signal contains a key signal or is an ordinary video signal not containing the key signal, and is discriminated from the input video signal by a CPU 2, explained later. A key-signal expansion enable/disable signal specifies the presence or absence of key signal expansion. A threshold change-over signal is used to change a threshold for use in separation between the key signal and video information. These signals should be known by a person who operates chroma-key control. Accordingly, it is necessary that these signals are input to the video signal reproducing circuit 60 from the CPU 2 (refer to Fig. 7) of a video signal processing circuit, separately from the input video signal and the threshold.

[0027] The operation of the video signal reproducing circuit 60 will be explained in conjunction with a flow of data. When the key signal enable/disable signal received from the CPU 2 is a disable indication, i.e., that the input video signal contains no key signal, the input video signal is selected at a video signal change-over circuit 605, delayed at a delay circuit 607, and then supplied as it is to a YC-RGB conversion circuit 611 and a combining circuit 612. At this time, the foreground key signal is selected in a key-signal change-over circuit 606 due to the key-signal enable/disable signal indicative of the disable and delayed at a delay circuit 608, and then applied to a key-signal expansion circuit 610 of the next stage. Since the key signal is also delayed at a delay circuit 609 and then applied to the key-signal expansion circuit 610, three inputs to the key-signal expansion circuit 610 all indicate the foreground key signals and the key-signal expansion enable/disable signal becomes invalid, whereby the foreground key signal is supplied from the key-signal expansion circuit 610 to the combin-

ing circuit 612 as it is.

[0028] When the key-signal enable/disable signal indicates the enable, i.e., that the input video signal contains the key signal, 8 bits of the input video signal are separately divided into the key signal and the video signal in accordance with the aforementioned decoding procedure using the threshold. More in detail, the video signal is first subjected at a clipping circuit 603 to a clipping operation at values of 128-256. At this time, if the input video signal has values of 1-127, then the clipping circuit 603 regards the input video signal to have a value of 128. The video signal subjected to the clipping operation is corrected by a correction circuit 604 so that values of 128-256 correspond to 0-254. This correction is carried out by an arithmetic operation such that "128" is subtracted from the values clipped by the clipping circuit 603 and then multiplied by 2.

[0029] Subsequently, the video information subjected to the correction is selected at the video signal change-over circuit 605, delayed at the delay circuit 607 and supplied to the YC-RGB conversion circuit 611 where conversion from Y (luminance) and C (chrominance) signals to RGB (red, green and blue) signals is carried out. And in the combining circuit 612, the video information is combined with a border color signal of, e.g., blue set by the CPU on the basis of the key signal received from the key-signal expansion circuit 610 to generate an output video signal which in turn is output from the combining circuit 612 to such a monitor display unit as a CRT.

[0030] When the key-signal enable/disable signal is enable, extraction of the key signal from the input video signal is simultaneously carried out. That is, the input video signal is compared with the threshold at a comparison circuit 602. Used as the threshold is the value of, e.g., 64, 96 or 128 selected by a threshold change-over signal previously specified in a threshold change-over circuit 601. As a result of the comparison between the input video signal and the threshold, when determining that the input video signal is larger than the threshold, the comparison circuit 602 outputs the foreground key signal; whereas, when determining that the input video signal is smaller than the threshold, the comparison circuit 602 outputs the background key signal. The key signal is selected at the key-signal change-over circuit 606 and applied directly to the key-signal expansion circuit 610, or delayed at the delay circuit 608 or at the delay circuits 608 and 609 and then applied to the key-signal expansion circuit 610.

[0031] In this case, the output of the delay circuit 608 is the key signal of the current pixel. When the input video signal is received with line scan or raster scan, the output of the key-signal change-over circuit 606 and the output of the delay circuit 609 are the key signals of pixels at its left-hand and right-hand adjacent to the pixel of the key signal corresponding to the output of the delay circuit 608. The key-signal expansion circuit 610 refers to the key signals of the left/right adjacent pixels and the key signal of the current pixel, outputs the foreground key signal only when all of these key signals indicate the foreground and otherwise outputs the background key signal, thus realizing the expansion of the background key signal.

[0032] Shown in Fig. 7 is a block diagram of an embodiment of the present invention when the reproduction circuit of Fig. 6 is applied to such a moving picture reproduction system that uses an MPEG video decoder (moving picture decoder) 10 based on video specifications called MPEG (moving picture experts group). Prior to explanation of the moving picture reproduction system of the present embodiment, explanation will be made of an example of a recording system for a CD-ROM in which moving picture data are recorded. A digital video signal to be recorded, which contains a luminance signal Y, chrominance signals Cb and Cr, is input to a preprocessing circuit. The component Y, which is made up of, e.g., 8 bits, is shifted toward the LSB side sequentially by one bit and "1" is set at the MSB using a shift register. Through this shifting operation, the LSB of the Y component is discarded. The chrominance signal Cr is output as it is and also applied to a coincidence circuit. The coincidence circuit for detecting a coincidence with a preset background color such as blue or black judges the presence or absence of the background and generates the aforementioned key signal. The key signal from the coincidence circuit is applied as a selection instruction signal to a selector circuit which selectively receives an output from the shift circuit and a preset value corresponding to the Y component signal regarded as an all 0 signal. When the key signal has a value of "0" indicative of the background, the selector circuit selects the Y component having a value of 0; while, when the key signal has a value of "1" indicative of the foreground, the selector circuit selects and outputs the Y component output shifted by the shift circuit and having a value of "1" at the MSB. The 3 components issued from the preprocessing circuit are applied to an encoder to be subjected therein to an encoding operation including a known MPEG encoding for data compression, and then recorded in such a recording medium as a CD-ROM as a video signal. At the time of the data compression, a signal level difference between the background and foreground is decompressed in accordance with the principle of Fig. 3.

[0033] Turning again to Fig. 7, the moving picture reproduction system of the present embodiment, as shown, includes a CD-ROM driver 1 for reading out moving picture data stored as compressed/coded in a CD-ROM, a microcomputer (CPU) 2 for separatedly dividing the read-out data into image data and voice data and also for decoding control information, an MPEG audio decoder 3 for decoding the separated moving picture data, an MPEG video decoder 10 for decoding the separated moving picture data, and a video signal reproducing circuit 60 having such a structure as shown in Fig. 6. A moving picture signal decoded by the MPEG

video decoder 10 is sent through the video signal reproducing circuit 60 to such a monitor as a CRT display unit, while the decoded audio signal is sent to an audio amplifier. In this case, the background image signal may be provided, e.g., from the CPU 2.

[0034] Also included in the moving picture reproduction system are a read only memory 4 for storing therein a program to be executed by the CPU 2 and fixed data, a randomly readable/writable memory 5 used as a work area of the CPU 2, and a buffer memory (frame memory) 20 connected to the MPEG video decoder 10 for temporarily holding the decoded image data therein. The MPEG video decoder 10 and the video signal reproducing circuit 60 are made in the form of a single chip LSI. The LSI chip has been marketed under the name of MPEG 1 Decoder LSI HD814101F later than the date of the convention priority claimed for the present application. However, the chip is not intended to disclose as the prior art.

[0035] Although the present invention made by the present inventor has been explained in detail in connection with the embodiments, it will be appreciated that the invention is not restricted to the specific embodiments but may be modified in various ways without departing from the scope of the invention as defined in the appended claims, as a matter of course. For example, the foregoing embodiments have been explained in the connection with the case where the input video signal is of a digital type, the present invention may be applied even to the case where the input video signal is of an analog type.

[0036] As has been explained in the foregoing, in accordance with the present invention, the need for modifying the prior art system for recording or transmitting known data compressed/decompressed data can be eliminated, the key signal for use in the video signal combining or composition can be recorded or transmitted as part of the video signal, and the key signal can be correctly restored or reproduced without being influenced by an error generated during the data compression/decompression.

Claims

1. A method for reproducing picture information from a compressed video signal which includes a key signal indicative of background or non-background in the picture and a converted video signal including picture information from an original video signal converted such that its signal levels have an offset from the level of the key signal indicative of background,

comprising the steps of:

decoding the compressed video signal,
comparing the decoded video signal with a preset threshold to judge whether it includes the key signal indicative of background,
clipping the decoded video signal to extract a video signal with the key signal removed,
correcting the level of the clipped video signal to remove said level offset, and
outputting said corrected video signal when it is judged in the comparison step that the key signal is not indicative of background.

2. A method according to claim 1, containing the step of selecting the level of said threshold so as to separate a video signal from the key signal indicative of background.

3. A method according to claim 2, wherein a plurality of threshold values is prepared and a value is selected to adjust the reproduction of the decoded video signal and key signal to the separation degree between foreground and background at the time of coding the video signal.

4. A method according to any of claims 1 to 3, wherein key signals of both pixels adjacent to a target pixel in reproduction of line scan or raster scan picture information are referred to and, when either one of said key signals indicates background, the key signal of the target pixel is made to have a value indicative of background.

5. A method according to any of claims 1 to 4, wherein said corrected video signal is converted to a video signal suitable for a display unit.

6. A method according to any of claims 1 to 5, wherein said compressed video signal is a digitised image signal having data pixels of a predetermined number of bits each, the key signal being assigned to the highest of said bits and a video signal with the lowest bit of the original video signal discarded is assigned to the remaining bits.

7. A method according to any of claims 1 to 6, wherein said video signal obtained through said decoding step is a digital video signal of a line scan type including moving picture information and is formatted to have said key signal assigned to its most significant bit and a least significant bit removed,

wherein a video signal indicative of the background is output when it is judged in the comparing step that the key signal indicates background, and said corrected video signal is output when the key signal indicates non-background.

8. A method according to any of claims 1 to 7, wherein said decoding step includes decompressing the compressed video signal.

9. A method according to any of claims 1 to 8, wherein

said non-background is the foreground of the picture information.

10. A method for coding a video signal including picture information, comprising the steps of:

converting a digitised original video signal of a predetermined number of bits per pixel by reducing said number of bits of the digitised signal and instead adding a key signal indicative of background or non-background in said picture, whereby a level of the video signal receives an offset from said level of the key signal that indicates background, and
coding the converted video signal to generate a compressed video signal.

11. A method according to claim 10, wherein the converting step includes the following steps:

separating the digitised video signal into a luminance component and a plurality of chrominance signals for each pixel,
comparing said plurality of chrominance signals with a pre-specified background colour to generate said key signal,
shifting said luminance component by one bit towards the least significant bit side for each pixel and assign said key signal to the most significant bit,
outputting in accordance with the generated key signal either the bit shifted luminance component or a signal having all bit values set to zero and,
combining said output luminance component and said plurality of chrominance signals for data compression.

12. A storage medium storing a compressed video signal obtained by a method according to claim 10 and or 11.

13. A storage medium storing a compressed video signal decodable by a method according to any of claims 1 to 9.

14. A system for reproducing picture information from a compressed video signal which includes a key signal indicative of background or non-background in the picture and a converted video signal including picture information from an original video signal converted such that its signal levels have an offset from the level of the key signal indicative of background,
comprising:

a decoder (10) for decoding the compressed video signal,
a comparator (602) for comparing the decoded video signal with a preset threshold to judge whether it includes the key signal indicative of background,
a clipping circuit (603) for clipping the decoded video signal to extract a video signal with the key signal removed,
a correction circuit (604) for correcting the level of the clipped video signal to remove said level offset, and
a synthesiser circuit (612) for outputting said corrected video signal when it is judged by the comparator (602) that the key signal is not indicative of background.

15. A system according to claim 14, wherein the decoder includes a decompression circuit (10).

16. A system according to claim 14 or 15, wherein said video signal obtained by said decoder (10) is a digital video signal of a line scan type including moving picture information and is formatted to have said key signal assigned to its most significant bit and the least significant bit removed, and said synthesiser circuit (612) outputs a video signal indicative of the background when it is judged by the comparator (602) that the key signal indicates background, and outputs said corrected video signal when the key signal indicates non-background.

Patentansprüche

1. Verfahren zur Wiedererzeugung von Bildinformationen aus einem komprimierten Videosignal, das ein Kennzeichensignal, das einen Hintergrund oder Nicht-Hintergrund in dem Bild angibt, und ein umgewandeltes Videosignal mit Bildinformationen aus einem ursprüngliche Videosignal, das so umgewandelt wurde, daß seine Signalpegel gegenüber dem Pegel des einen Hintergrund angebenden Kennzeichensignals einen Versatz aufweisen, enthält,
mit folgenden Schritten:

Dekodieren des komprimierten Videosignals,
Vergleichen des dekodierten Videosignals mit einer vorbestimmten Schwelle, um zu beurteilen, ob es das einen Hintergrund angebende Kennzeichensignal enthält,
Beschneiden des dekodierten Videosignals, um ein Videosignal zu gewinnen, bei dem das Kennzeichensignal entfernt ist,
Korrigieren des Pegels des beschnittenen Videosignals, um den genannten Pegelversatz zu eliminieren, und
Ausgeben des korrigierten Videosignals, wenn im Vergleichsschritt erkannt wird, daß das

Kennzeichensignal keinen Hintergrund angibt.

2. Verfahren nach Anspruch 1 mit einem Schritt zum Wählen des Pegels der Schwelle, so daß ein Videosignal von dem einen Hintergrund angebenden Kennzeichensignal getrennt ist.

3. Verfahren nach Anspruch 2, wobei mehrere Schwellenwerte vorbereitet werden und ein Wert ausgewählt wird, um die Wiedererzeugung des dekodierten Videosignals und des Kennzeichensignals auf den Grad der Trennung zwischen Vordergrund und Hintergrund zum Zeitpunkt des Kodieren des Videosignals einzustellen.

4. Verfahren nach einem der Ansprüche 1 bis 3, wobei bei der Wiedererzeugung von Bildinformationen einer Zeilenabtastung oder Rasterabtastung Kennzeichensignale beider einem betrachteten Pixel benachbarter Pixel betrachtet werden und dann, wenn eines dieser Kennzeichensignale einen Hintergrund angibt, dem Kennzeichensignal des betrachteten Pixels ein einen Hintergrund angebender Wert gegeben wird.

5. Verfahren nach einem der Ansprüche 1 bis 4, wobei das korrigierte Videosignal in ein Videosignal umgewandelt wird, das für eine Anzeigeeinheit geeignet ist.

6. Verfahren nach einem der Ansprüche 1 bis 5, wobei das komprimiert Videosignal ein digitalisiertes Bildsignal mit Datenpixeln jeweils einer vorbestimmten Zahl an Bits ist, das Kennzeichensignal dem höchstwertigsten der Bits zugeordnet wird und ein Videosignal, worin das niederwertigste Bit des ursprünglichen Videosignals fallen gelassen wurde, den übrigen Bits zugeordnet ist.

7. Verfahren nach einem der Ansprüche 1 bis 6, wobei das über den Dekodierschritt erhaltene Videosignal ein digitales Videosignal in der Art einer Zeilenabtastung ist, das Informationen bewegter Bilder enthält und so formatiert ist, daß das Kennzeichensignal seinem höchstwertigsten Bit zugeordnet ist und ein niederwertigstes Bit entfernt ist, wobei ein den Hintergrund angebendes Videosignal ausgegeben wird, wenn in dem Vergleichsschritt erkannt wird, daß das Kennzeichensignal einen Hintergrund angibt, und das korrigierte Videosignal ausgegeben wird, wenn das Kennzeichensignal Nicht-Hintergrund angibt.

8. Verfahren nach einem der Ansprüche 1 bis 7, wobei der Dekodierschritt ein Dekomprimieren des komprimierten Videosignals beinhaltet.

9. Verfahren nach einem der Ansprüche 1 bis 8, wobei Nicht-Hintergrund den Vordergrund der Bildinformationen bedeutet.

10. Verfahren zum Kodieren eines Videosignals mit Bildinformationen, mit folgenden Schritten:

Umwandeln eines digitalisierten Originalvideosignals einer vorbestimmten Zahl an Bits pro Pixel durch Verringerung der Zahl an Bits des digitalisierten Signals und stattdessen Hinzufügen eines Kennzeichensignals, das einen Hintergrund oder Nicht-Hintergrund in dem Bild angibt, wodurch der Pegel des Videosignals einen Versatz gegenüber demjenigen Pegel des Kennzeichensignals erhält, der einen Hintergrund angibt, und
Kodieren des umgewandelten Videosignals, um ein komprimiertes Videosignal zu erhalten.

11. Verfahren nach Anspruch 10, wobei der Umwandlungsschritt die folgenden Schritte beinhaltet:

Trennen des digitalisierten Videosignals in eine Luminanzkomponente und mehrere Chrominanzsignale für jedes Pixel,
Vergleichen der mehreren Chrominanzsignale mit einer vorbestimmten Hintergrundfarbe, um das Kennzeichensignal zu erzeugen,
Verschieben der Luminanzkomponente um ein Bit zur Seite des niederwertigsten Bits jedes Pixels und Zuordnen des Kennzeichensignals zu dem höchstwertigsten Bit,
Ausgeben entweder der Bit-verschobenen Luminanzkomponente oder eines Signals, dessen Bitwerte alle auf Null gesetzt sind, entsprechend dem erzeugten Kennzeichensignal, und Kombinieren der ausgegebenen Luminanzkomponente und der Chrominanzsignale zur Datenkompression.

12. Speichermedium mit einem gespeicherten komprimierten Videosignal, das durch ein Verfahren nach Anspruch 10 oder 11 erhalten wurde.

13. Speichermedium mit einem gespeicherten komprimierten Videosignal, das durch ein Verfahren nach einem der Ansprüche 1 bis 9 dekodierbar ist.

14. System zur Wiedergabe von Bildinformationen aus einem komprimierten Videosignal, das ein einen Hintergrund oder Nicht-Hintergrund in dem Bild angegebenes Kennzeichensignal und ein umgewandeltes Videosignal mit Bildinformationen aus einem ursprünglichen Videosignal, das so umgewandelt ist, daß seine Signalpegel einen Versatz gegenüber dem Pegel des einen Hintergrund angebenden Kennzeichensignals aufweisen, enthält,
aufweisend:

einen Dekoder (10) zur Dekodierung des komprimierten Videosignals,
einen Vergleicher (602) zum Vergleichen des dekodierten Videosignals mit einer vorbestimmten Schwelle, um zu beurteilen, ob es das einen Hintergrund angebende Kennzeichensignal enthält,
eine Clipschaltung (603) zum Beschneiden des dekodierten Videosignals, um ein Videosignal mit entferntem Kennzeichensignal zu gewinnen,
eine Korrekturschaltung (604) zum Korrigieren des Pegels des beschnittenen Videosignals, um den Pegelversatz zu eliminieren, und
eine Synthetisierungsschaltung (612) zur Ausgabe des korrigierten Videosignals, wenn vom Vergleicher (602) erkannt wird, daß das Kennzeichensignal keinen Hintergrund angibt.

15. System nach Anspruch 14, wobei der Dekoder eine Dekompressionsschaltung (10) enthält.

16. System nach Anspruch 14 oder 15, wobei das vom Dekoder (10) gewonnene Videosignal ein digitales Videosignal nach Art einer Zeilenabtastung ist, das Informationen bewegter Bilder enthält und so formatiert ist, daß das Kennzeichensignal seinem höchstwertigsten Bit zugeordnet ist und das niederwertigste Bit entfernt ist, wobei die Synthetisierungsschaltung (612) ein den Hintergrund wiedergebendes Videosignal ausgibt, wenn vom Vergleicher (602) erkannt wird, daß das Schlüsselsignal einen Hintergrund angibt, und das korrigierte Videosignal ausgibt, wenn das Kennzeichensignal Nicht-Hintergrund angibt.

Revendications

1. Procédé pour reproduire des informations d'image à partir d'un signal vidéo comprimé qui comporte un signal clé représentatif d'un arrière-plan ou d'un non-arrière-plan dans l'image et un signal vidéo converti comportant des informations d'image à partir d'un signal vidéo initial converti de sorte que ses niveaux de signal ont un décalage par rapport au niveau du signal clé représentatif d'un arrière-plan,

comportant les étapes consistant à :

décoder le signal vidéo comprimé,
comparer le signal vidéo décodé à un seuil préétabli pour juger s'il comporte le signal clé représentatif d'un arrière-plan,
écrêter le signal vidéo codé pour extraire un signal vidéo où le signal clé a été éliminé,
corriger le niveau du signal vidéo écrêté pour éliminer ledit décalage de niveau, et
émettre ledit signal vidéo corrigé lorsqu'il est jugé à l'étape de comparaison que le signal clé n'est pas représentatif d'un arrière-plan.

2. Procédé selon la revendication 1, comportant l'étape consistant à sélectionner le niveau dudit seuil de manière à séparer un signal vidéo du signal clé représentatif d'un arrière-plan.

3. Procédé selon la revendication 2, dans lequel une pluralité de valeurs de seuil est préparée et une valeur est sélectionnée pour ajuster la reproduction du signal vidéo décodé et du signal clé au degré de séparation entre un premier plan et un arrière-plan au moment du codage du signal vidéo.

4. Procédé selon l'une quelconque des revendications 1 à 3, dans lequel on se réfère à des signaux clés des deux pixels adjacents à un pixel cible lors de la reproduction d'informations d'image par balayage monoligne ou balayage tramé et, lorsque l'un desdits signaux clés indique un arrière-plan, le signal clé du pixel cible est amené à avoir une valeur représentative d'un arrière-plan.

5. Procédé selon l'une quelconque des revendications 1 à 4, dans lequel ledit signal vidéo corrigé est converti en un signal vidéo adapté à une unité d'affichage.

6. Procédé selon l'une quelconque des revendications 1 à 5, dans lequel ledit signal vidéo comprimé est un signal d'image numérisé ayant des pixels de données d'un nombre prédéterminé de bits chacun, le signal clé étant affecté au plus fort desdits bits et un signal vidéo ayant le bit le plus faible du signal vidéo initial rejeté, est affecté aux bits restants.

7. Procédé selon l'une quelconque des revendications 1 à 6, dans lequel ledit signal vidéo obtenu par l'intermédiaire de ladite étape de décodage est un signal vidéo numérique du type à balayage monoligne incluant des informations d'image mobile et est formaté pour avoir ledit signal clé affecté à son bit le plus significatif et avoir le bit le moins significatif éliminé,

dans lequel un signal vidéo représentatif de l'arrière-plan est émis lorsqu'il est jugé à l'étape de comparaison que le signal clé indique un arrière-plan, et ledit signal vidéo corrigé est émis lorsque le signal clé indique un non-arrière-plan.

8. Procédé selon l'une quelconque des revendications 1 à 7, dans lequel ladite étape de décodage inclut la décompression du signal vidéo comprimé.

9. Procédé selon l'une quelconque des revendications 1 à 8, dans lequel ledit non-arrière-plan est le pre-

mier plan des informations d'image.

10. Procédé pour coder un signal vidéo incluant des informations d'image, comportant les étapes consistant à :

convertir un signal vidéo initial numérisé ayant un nombre prédéterminé de bits par pixel en réduisant ledit nombre de bits du signal numérisé et en ajoutant à la place un signal clé représentatif d'un arrière-plan ou d'un non-arrière-plan de ladite image, de sorte qu'un niveau du signal vidéo contient un décalage par rapport audit niveau du signal clé qui indique un arrière-plan, et
coder le signal vidéo converti pour générer un signal vidéo comprimé.

11. Procédé selon la revendication 10, dans lequel l'étape de conversion inclut les étapes suivantes consistant à :

séparer le signal vidéo numérisé en une composante de luminance et une pluralité de signaux de chrominance pour chaque pixel,
comparer ladite pluralité de signaux de chrominance à une couleur d'arrière-plan pré-spécifiée pour générer ledit signal clé,
déplacer ladite composante de luminance d'un bit vers le côté du bit le moins significatif pour chaque pixel et affecter ledit signal clé au bit le plus significatif,
émettre conformément au signal clé généré la composante de luminance déplacée d'un bit ou un signal ayant toutes les valeurs binaires établies à zéro, et
combiner ladite composante de luminance de sortie et ladite pluralité de signaux de chrominance pour une compression de données.

12. Support de mémorisation mémorisant un signal vidéo comprimé obtenu par un procédé selon la revendication 10 ou 11.

13. Support de mémorisation mémorisant un signal vidéo comprimé pouvant être décodé par un procédé selon l'une quelconque des revendications 1 à 9.

14. Système de reproduction d'informations d'image à partir d'un signal vidéo comprimé qui comporte un signal clé représentatif d'un arrière-plan ou d'un non-arrière-plan dans l'image et d'un signal vidéo converti incluant des informations d'image à partir d'un signal vidéo initial converti de sorte que ses niveaux de signal ont un décalage par rapport au niveau du signal clé représentatif d'un arrière-plan, comportant :

un décodeur (10) pour décoder le signal vidéo comprimé,
un comparateur (602) pour comparer le signal vidéo décodé à un seuil préétabli pour juger s'il comporte le signal clé représentatif d'un arrière-plan,
un circuit d'écrêtage (603) pour écrêter le signal vidéo décodé afin d'extraire un signal vidéo où le signal clé a été éliminé,
un circuit de correction (604) pour corriger le niveau du signal vidéo écrêté afin d'éliminer ledit décalage de niveau, et
un circuit synthétiseur (612) pour émettre ledit signal vidéo corrigé lorsqu'il est jugé par le comparateur (602) que le signal clé n'est pas représentatif d'un arrière-plan.

15. Système selon la revendication 14, dans lequel le décodeur comporte un circuit de décompression (10) .

16. Système selon la revendication 14 ou 15, dans lequel ledit signal vidéo obtenu par ledit décodeur (10) est un signal vidéo numérique du type à balayage monoligne incluant des informations d'image mobile et est formaté pour avoir ledit signal clé affecté à son bit le plus significatif et pour avoir le bit le moins significatif éliminé, et ledit circuit synthétiseur (612) émet un signal vidéo représentatif de l'arrière-plan lorsqu'il est jugé par le comparateur (602) que le signal clé indique un arrière-plan, et émet ledit signal vidéo corrigé lorsque ledit signal clé indique un non-arrière-plan.

FIG.1

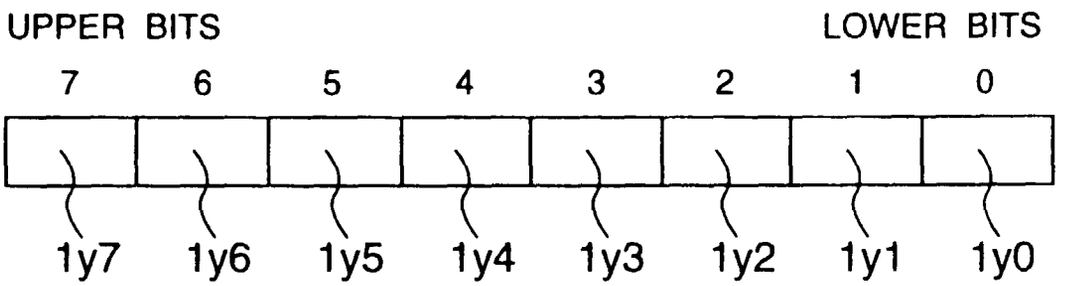

UPPER BITS
LOWER BITS
7
6
5
4
3
2
1
0
1y7
1y6
1y5
1y4
1y3
1y2
1y1
1y0

FIG.2

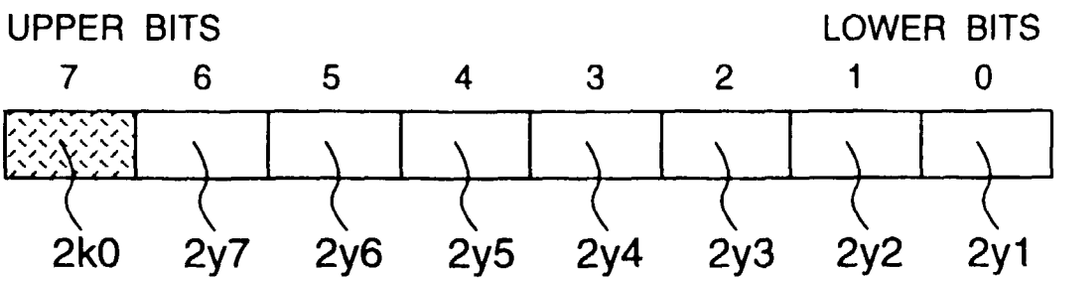

UPPER BITS
LOWER BITS
7
6
5
4
3
2
1
0
2k0
2y7
2y6
2y5
2y4
2y3
2y2
2y1

FIG.3

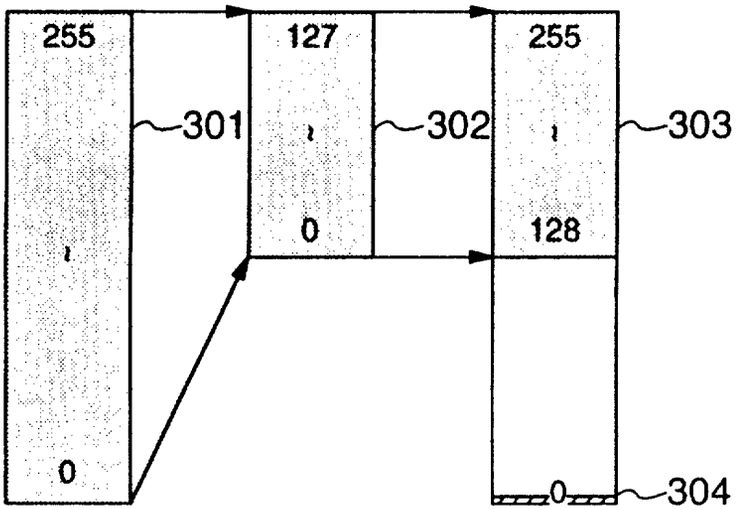

255
127
255
301
302
303
0
128
0
304

FIG.4

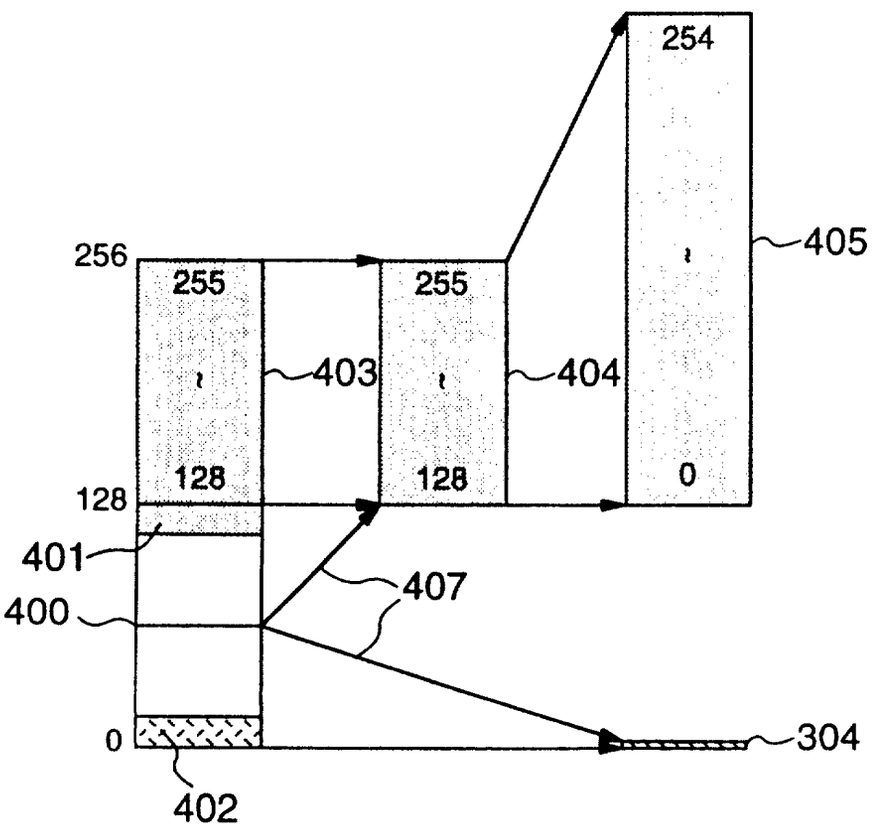

254
405
256
255
255
403
404
128
128
0
128
401
407
400
0
304
402

FIG.5

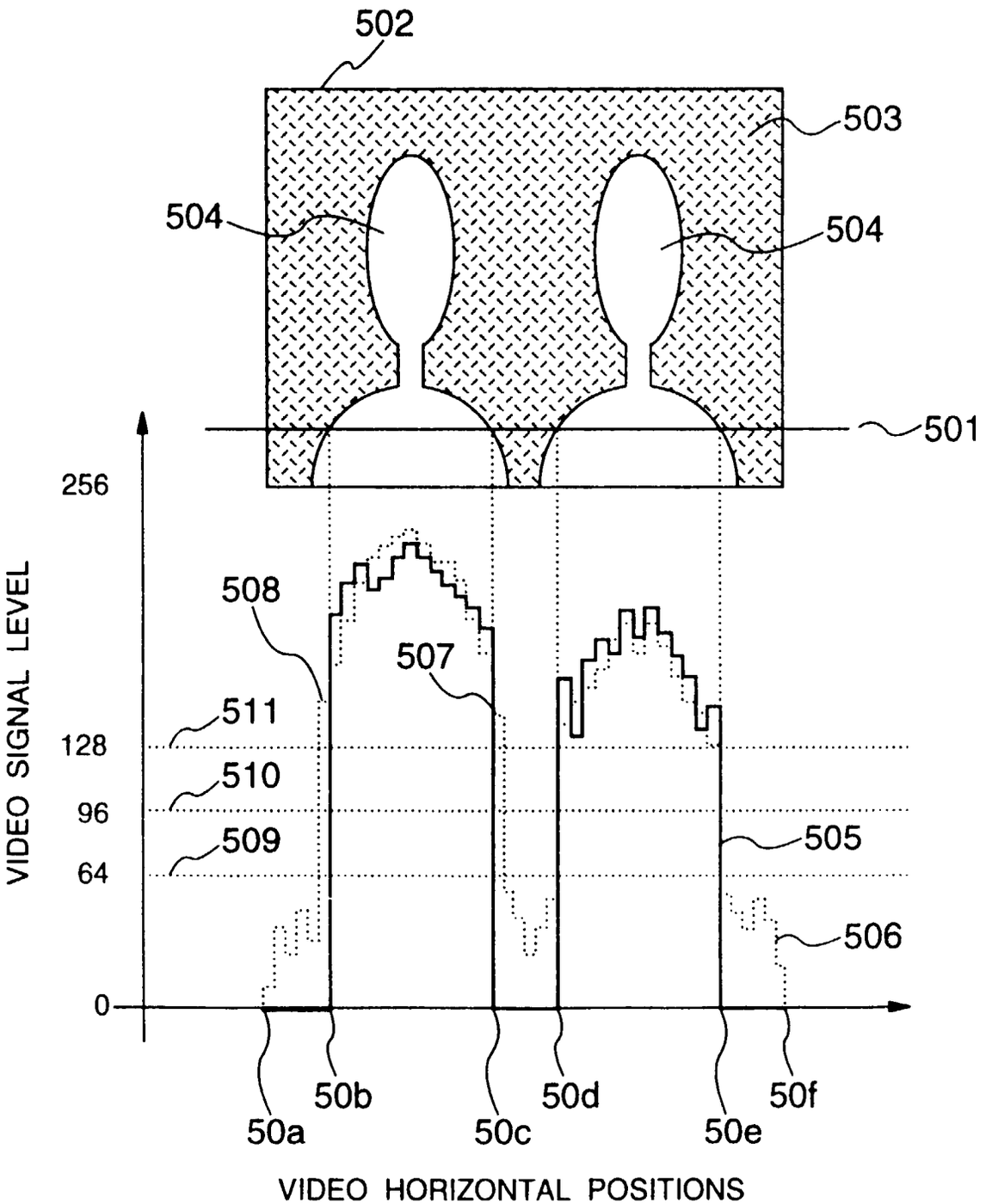

502
503
504
504
501
256
128
96
64
0
VIDEO SIGNAL LEVEL
508
507
511
510
509
505
506
50a
50b
50c
50d
50e
50f
VIDEO HORIZONTAL POSITIONS

FIG.6

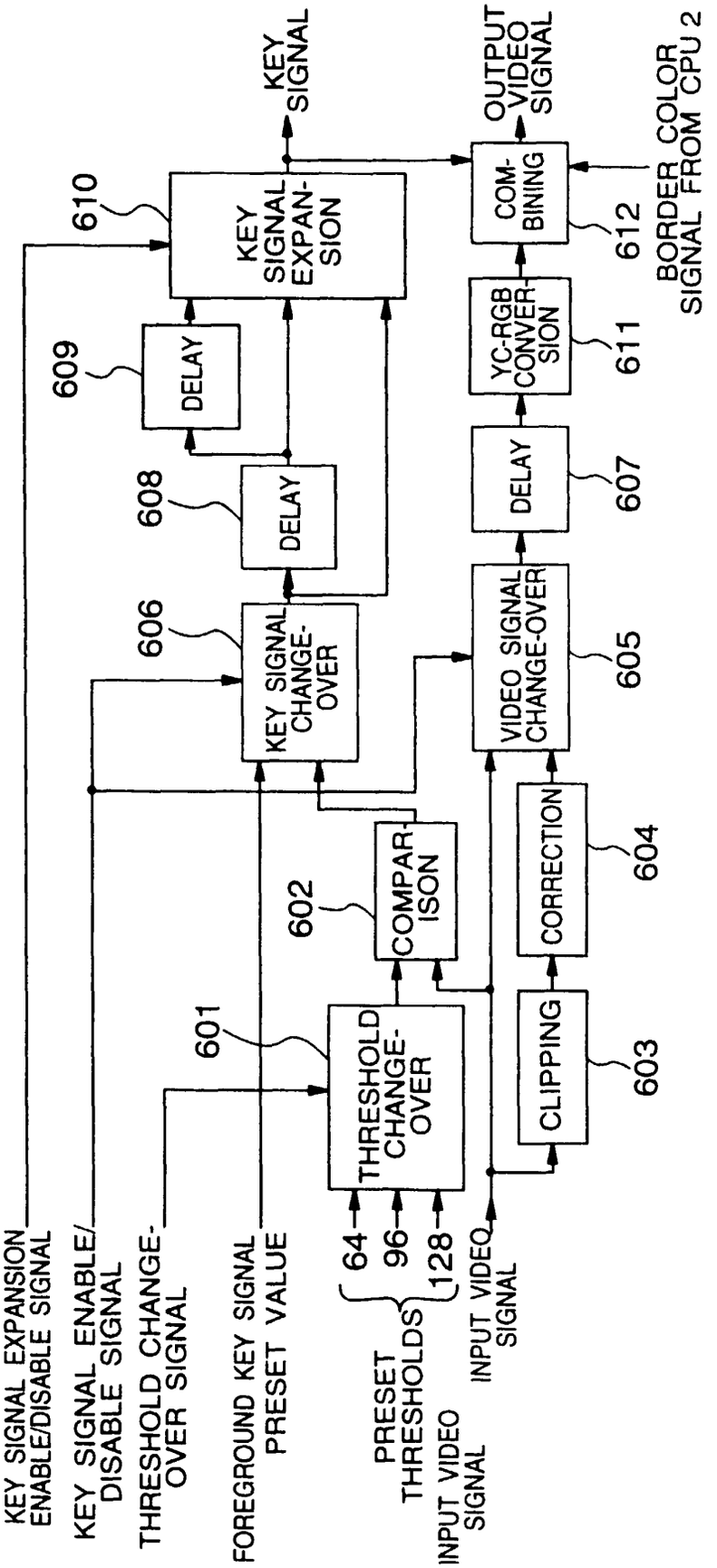
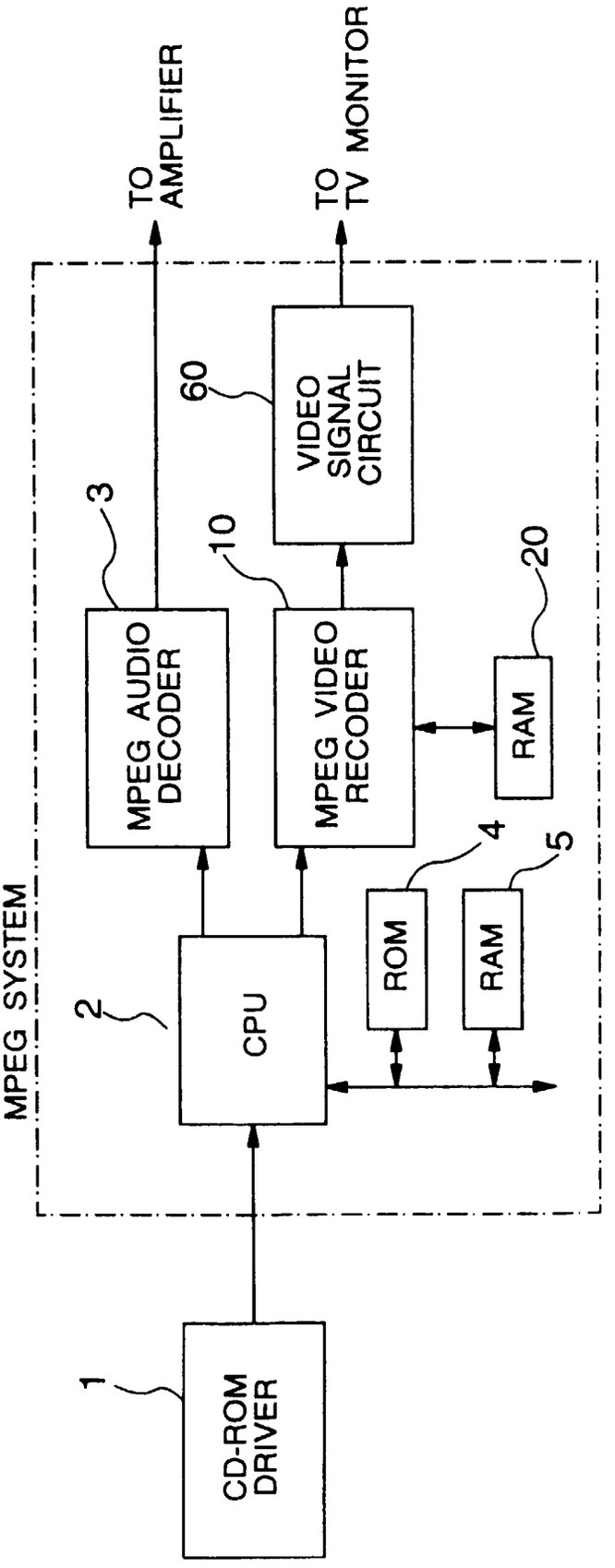

60
KEY SIGNAL EXPANSION ENABLE/DISABLE SIGNAL
KEY SIGNAL ENABLE/DISABLE SIGNAL
THRESHOLD CHANGE-OVER SIGNAL
FOREGROUND KEY SIGNAL PRESET VALUE
PRESET THRESHOLDS
64
96
128
INPUT VIDEO SIGNAL
INPUT VIDEO SIGNAL
601
THRESHOLD CHANGE-OVER
602
COMPARISON
603
CLIPPING
604
CORRECTION
605
VIDEO SIGNAL CHANGE-OVER
606
KEY SIGNAL CHANGE-OVER
607
DELAY
608
DELAY
609
DELAY
610
KEY SIGNAL EXPANSION
611
YC-RGB CONVERSION
612
COMBINING
KEY SIGNAL
OUTPUT VIDEO SIGNAL
BORDER COLOR SIGNAL FROM CPU 2

FIG.7


TO AMPLIFIER
TO TV MONITOR
MPEG SYSTEM
CD-ROM DRIVER
1
CPU
2
MPEG AUDIO DECODER
3
MPEG VIDEO RECODER
10
VIDEO SIGNAL CIRCUIT
60
ROM
4
RAM
5
RAM
20